Claims

[c1] 1. A method for measuring tubular anatomical structures from acquired image data comprising:
isolating by at least one segmentation process a given tubular anatomical structure of interest;
measuring at least one attribute of the structure of interest.

[c2] 2. The method of claim 2 wherein the at least one segmentation process comprises segmenting, detecting and grouping of homogeneous regions within the acquired image data.

[c3] 3. The method of claim 1 wherein the tubular anatomical structures are at least one of bronchial walls, lung airways, arteries and major blood vessels.

[c4] 4. The method of claim 1 wherein the attribute comprises at least one of average wall thickness, wall thickness variations, volume measurements, two-dimensional (2D) area measurements and volume area distribution.

[c5] 5. The method of claim 1 wherein the measuring step comprises:
fitting an inner ellipse to an inner boundary of the given tubular structure and an outer ellipse to an outer boundary of the given tubular structure using statistical techniques; and,
measuring a thickness of the given tubular structure using the inner and outer ellipses.

[c6] 6. The method of claim 1 wherein the image data is acquired using at least one computed tomography (CT), magnetic resonance imaging (MRI), x-ray, and ultrasound.

[c7] 7. The method of claim 1 wherein the isolating and measuring steps are repeated for image data corresponding to a length of the given tubular structure to generate measurements along the length of the given tubular structure.

[c8] 8. The method of claim 1 wherein the tubular structures are measured during non-destructive testing.

[c9] 9. A method for measuring lung airways from acquired image data comprising:
isolating by at least one segmentation process a given airway of interest;
fitting an inner ellipse to an inner boundary of the given airway and an outer ellipse to an outer boundary of the airway structure using statistical techniques at a given point in the airway; and,
generating measurements of the given airway using the inner and outer ellipses.

[c10] 10. The method of claim 9 wherein the at least one segmentation process comprises segmenting, detecting and grouping of homogeneous regions within the acquired image data.

[c11] 11. The method of claim 9 wherein the measurements comprises at least one of average wall thickness, wall thickness variations, volume measurements, two-dimensional (2D) area measurements and volume area distribution.

[c12] 12. The method of claim 9 wherein the measurements are used for at least one of disease diagnosis and tracking of disease progression, and wherein the disease is chronic obstructive pulmonary disease.

[c13] 13. The method of claim 9 wherein the steps of isolating, fitting and generating measurements are repeated for image data corresponding to a length of the given airway to generate measurements along the length of the given airway.

[c14] 14. The method of claim 9 further comprising generating an output, wherein the output is used for at least one of staging the given disease in a patient, measuring response to therapy, phenotyping for patient selection to participate in drug trials, measuring stability of an anatomical structure and prediction of rate of change of the given disease.

[c15] 15. A system for measuring lung airways using acquired image data comprising:
an imaging device for acquiring the image data; and,
an image processing device coupled to the imaging device and configured for isolating by at least one segmentation process a given airway of interest, fitting an inner ellipse to an inner boundary of the given airway and an outer ellipse to an outer boundary of the airway structure using statistical techniques at a given point in the airway, and further configured for generating measurements of the

given airway using the inner and outer ellipses.

[c16] 16. The system of claim 15 wherein the measurements comprises at least one of average wall thickness, wall thickness variations, volume measurements, two-dimensional (2D) area measurements and volume area distribution.

[c17] 17. The system of claim 15 wherein the measurements are used for at least one of disease diagnosis and tracking of disease progression, and wherein the disease is at least one of chronic obstructive pulmonary disease and asthma.

[c18] 18. The system of claim 15 further comprising a display device coupled to the image processing device for reporting measurements to a system user.

[c19] 19. The system of claim 15 wherein the image processor is further adapted to generate an output and wherein the output is used for at least one of staging the given disease in a patient, measuring response to therapy, phenotyping for patient selection to participate in drug trials, measuring stability of an anatomical structure and prediction of rate of change of the given disease.

[c20] 20. The system of claim 15 wherein the imaging device is at least one of a computed tomography (CT) device, a magnetic resonance imaging (MRI) device, a x-ray device, and an ultrasound device.